




EQUILIBRIUM REAL EXCHANGE RATE, CURRENCY MISALIGNMENT, AND TRADE PERFORMANCE - THE CASE OF VIETNAM: 1992-2017



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ABSTRACT

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This paper is conducted to uncover the determinants of the equilibrium real exchange rate and evaluate the magnitude of exchange rate misalignment for the Vietnamese dong over the period 1992-2017 under the cointegration framework. The results of econometric analysis indicate that the Vietnamese dong was overvalued during the periods 1996-2002, 2007-2010, 2015-2017. This was due to the fact that the Vietnamese dong was rigidly kept stable while the economy experienced a persistent high inflation environment through many consecutive years in the past. The overvaluation of the Vietnamese dong apparently contributed to the deterioration of the trade account. The monetary authority allowed the currency to be largely devaluated only at the time when loss of competitiveness was clearly discerned and when there were pressures emerged from crisis periods. The findings suggest that the real exchange rate should be managed in line with its equilibrium level and any misalignment should be adjusted on time in order to maintain the country's trade competitiveness and external equilibrium.

Contribution/ Originality: This study contributes to the existing literature by documenting empirical evidence on the determinants of the equilibrium real exchange rate and the magnitude of currency misalignment for the Vietnamese dong and sheds light on the role of exchange rate policy in maintaining the country's external competitiveness throughout the period 1992-2017.

1. INTRODUCTION

The exchange rate serves as a crucial linkage between any open economy and the outside world. Its movement is expected to exert considerable influence on macroeconomic performance. However, given the existent literature on the exchange rate, there is no clear-cut answer for perennial questions such as: which exchange rate regime is a proper choice for economies? How would policy makers manage the exchange rate for achieving objectives as diverse as inflation control, volatility reduction and competitiveness improvement? There exists a trade-off between the fixed regime and the floating one, while there is little consensus in terms of empirical findings on the role of exchange rate regimes in regard to the two most concerned variables of macroeconomic performance, inflation and growth (Nguyen, 2012). It is difficult to ascertain the pros and cons of the two regimes without referring to specific circumstances in practice (Pilbeam, 1998). For example, if a country is frequently influenced by external disturbances, in principle it would find a floating rate regime more relevant (Frankel, 1999). This option may not be feasible, however, without strong political and monetary institution. It turns out that "an informed

choice of exchange rate regime requires a deep understanding” of a specific country’s circumstances (Calvo and Mishkin, 2003). Accordingly, for a given country, any recommendation communicated to policy makers in terms of the appropriateness of exchange rate strategies would be based on a thorough examination of the practice of its exchange rate policy.

In Vietnam, the exchange rate drew attention of policy makers only since the late 1980s, when radical economic reforms were launched to drive the economy sustainably on the market-oriented path. Since then, the mechanism of exchange rate setting has undergone several adjustments. Initially, a system of multiple rates was replaced by a single announced fixed rate at the beginning of the “open door policy” period, then followed by the current system since late 1991, which has operated within the framework of a narrow adjustable trading band around the official rate (Nguyen, 2018). The rule by which the official rate is set was changed several times but it is basically set on a daily basis and is intentionally regulated to reflect the dynamics of market forces. These reforms are popularly viewed as an important part of the economic renovation. Given these reforms, has the mechanism of exchange rate setting been regulated in a manner that helped attain macroeconomic objectives such as trade competitiveness and inflation control?

In spite of the remarkable reforms adopted in the setting of exchange rate, there has been a rising concern from time to time about the misalignment of the value of the Vietnamese dong (VND). Nguyen (2012;2018) considers that the exchange rate setting arrangement has rather contained administrative elements to such an extent that the bilateral VND/USD rate has been rigidly monitored. As a consequence, the country’s exchange rate regime has essentially operated as a peg one with USD being the anchor currency. Given the high inflation environment persistent throughout many consecutive years in the past, such a practice of exchange rate setting may have made the domestic currency substantially overvalued, inducing a loss of external competitiveness.

More specifically, it is not clear if exchange rate policy was implemented in such a manner that supported the maintenance or improvement of the country’s competitiveness or not. In the international context, many studies have focused either on measuring the degree of currency misalignment or investigating the role of exchange rate in promoting trade performance. The findings from these studies appear to provide certain foundation for assessing the practice of exchange rate policy as well as providing implications for the conduct of exchange rate policy for the country or region or group of countries of study. One of the important notices implied by these studies is that the findings appear country-specific and may not be generalized for other countries.

In this paper, the author seeks to estimate the equilibrium real exchange rate for the Vietnamese dong and analyses the magnitude of its value misalignment over the period 1992-2017. For achieving this objective, the author follows an approach proposed by Edwards (1989;1994) and Montiel (1999) through employing relevant cointegration techniques. The finding would provide additional evidence to shed light on the role of exchange rate policy in Vietnam in maintaining the country’s external competitiveness throughout the period 1992-2017. As such, the paper would provide a foundation for the formulation, analysis and evaluation of future policy. In the context that Vietnam was recently added to the currency manipulation watchlist of the United States Treasury Department, the empirical evidence reported in the paper would also be an informative reference that the Vietnamese authority may share with the US Treasury Department and cooperate to tackle the issue of concern. Furthermore, the paper may be of interest to policy makers and their advisers in other developing and transitional economies faced with similar policy choice.

The rest of the paper is organized as follows. Section 2 briefly presents a review of literature from international context as well from the Vietnamese context. This section reviews the research streams in this specific area and shed light on the research gap and the importance of the current research. Section 3 presents research methods applied as well as the sources of data. Section 4 reports empirical results with relevant discussion. Finally, section 5 concludes and provides implications.

2. LITERATURE REVIEW

An exchange rate regime is basically defined as a system of rules that specify how a country's exchange rates are determined. Normally, the rules would explicitly or implicitly specify whether the government does or does not conduct market intervention to regulate the behaviour of the exchange rate. Thus, different regimes would induce different degrees of exchange rate flexibility. In reality, exchange rate regimes can be classified into a spectrum from full dollarization or currency union with no separate legal tender at one extreme, to independent floating at the other (Frankel, 1999; IMF, 2004). However, the choice of exchange rate regime is not an easy decision for policy makers because there exists a trade-off between the fixed regime on the one hand and the floating regime on the other (Pilbeam, 1998) while the existing literature indicates "no clear link between the exchange rate regime and macroeconomic performance" (Ghosh *et al.*, 1996).

In practice, countries in the world have adopted different exchange rate regimes and conducted strategic shifts from one regime to another for objectives as diverse as inflation control, volatility reduction and competitiveness improvement (Frieden *et al.*, 2001). Since the fall of the Bretton Woods system in 1971, the mix of exchange rate regimes has changed considerably, especially among developing and emerging countries. In the early 1970s, while many advanced economies adopted floating regimes, most developing countries maintained peg regimes (IMF, 1997). Since the decade 1990, nevertheless, a shift towards more flexible regimes has become popular among developing countries and emerging countries (Karacadag *et al.*, 2004). There was a record of about 139 exits to more flexible regimes during years 1990-2002 (Dutttagupta *et al.*, 2004). Particularly, while there was almost no country adopting a floating regime in the early 1990s, about 40 per cent of emerging countries were identified as shifting to this regime in the early 2000s (IMF, 2004b).

The tendency towards greater flexibility is expected to remain continuous for several causes (Dutttagupta *et al.*, 2004). Firstly, fixed regimes turn out to give rise to crises more often than flexible ones. Secondly, an inability to conduct sound macroeconomic policies may potentially force some countries to exit from fixed regimes. Thirdly, a higher degree of exchange rate flexibility appears to be required to reduce the risks arisen from the process of economic integration. The recent surge in capital inflows has also required emerging economies to consider adopting more flexible regimes because it has caused significant volatilities in demand for and supply of currencies and has made the conduct of monetary policy more complicated under fixed regimes. Moreover, once economies become more advanced, they could benefit more from exchange rate flexibility (Rogoff *et al.*, 2003).

In general, of the "two commonly classified exchange rate regimes", fixed and floating, the former one is normally viewed as having a major potential problem that it may induce serious exchange rate misalignment in the long-run (Nguyen, 2012). The operation of a fixed regime requires a high discipline in conducting monetary and fiscal policies. However, if the central bank does not have deep-rooted credibility in fighting inflation, the fixed exchange rate could become persistently misaligned in that the local currency is artificially overvalued. In this situation, its commitment to a fixed regime becomes quickly weakened, igniting a speculative attack (Mishkin, 1999). Consequences of any speculative attack are detrimental to the stability of the economy, possibly resulting in rapid exhaustion of official reserves and even forcing abandonment of the fixed regime. Given such a circumstance, the operation of a fixed or peg regime may drive the real exchange rate faraway from its equilibrium level, hence probably leading to serious trade imbalances. In other words, if the exchange rate is rigidly kept at a certain level in the context of a domestic high inflation environment, the domestic currency will be cumulatively overvalued, inducing a substantial loss in external competitiveness (Ohno, 2003). This theoretical approach has essentially led to two exchange rate related research streams, especially with regards to the practice of exchange rate policy conducted in emerging economies. The first research stream places a focus on estimating the equilibrium real exchange rate (ERER) and evaluate the magnitude of currency misalignment while the second stream investigates the trade performance under the impact of exchange rate movement. The findings from these two research streams

potentially serve as foundation for evaluating the practice of exchange rate policy and providing implications for future policy strategies given the country-specific circumstances.

In the first research stream, many studies have been carried out to measure the extent of currency misalignment for developing and emerging economies by adopting different approaches. For example, based on the model recommended by [Edwards \(1988\)](#); [Nabli \(2002\)](#) estimates the EREER for MENA countries and determines the extent of overvaluation of currencies of these countries during the period 1975-1999. The study shows an evidence of a strong overvaluation of these currencies during the 1970s and 1980s, leading to deterioration in competitiveness. The study also reports a decrease in the overvaluation of these currencies in the 1990s as a possible consequence of the move to more flexible regimes or a possible result of better macroeconomic management; however, the magnitude of misalignment still remains high as compared with that in other regions. With a similar approach, [Mongardini \(1998\)](#) estimates the EREER for Egypt for the period 1987-1996 and reports that the Egyptian pound was substantially overvalued before 1993, but the appreciation of this currency in the following years did not indicate a worsening misalignment. Also based on the model introduced by [Edwards \(1988\)](#); [Goh and Kim \(2006\)](#) derive the EREER for renminbi (RMB) for the period 1987-2002 and estimate the degree of currency misalignment accordingly. The authors find no evidence of significant currency undervaluation during years at the end of the examined period. Adopting the concept of behaviour equilibrium exchange rate (BEER), [Jongwanich \(2009\)](#) estimates the EREER and the extent of exchange rate misalignment for a number of Asian countries for the period 1995-2008, followed by testing whether export performance of Asian countries was driven by the extent of currency misalignment. The study reports evidence that the currencies of the crisis-affected countries appeared to be persistently overpriced in several years leading up to the 1997-1998 Asian financial crisis while becoming undervalued after the crisis. The study also suggests that export performance was negatively influenced by exchange rate misalignment. [Vitek \(2009\)](#) conducts an evaluation of trade competitiveness for Mozambique for the period 1992-2008 by adopting several approaches to the measurement of currency misalignment. The results reveal that the currency of Mozambique was seriously overpriced in real effective terms, thus exerting negative effects on economic growth and threatening the external equilibrium. Most of the studies in this stream employ advances in econometrics such as the cointegration technique with two-step cointegration analysis introduced by [Engle and Granger \(1987\)](#) and the cointegration framework developed by [Johansen and Juselius \(1990\)](#).

In the second stream, most studies investigate the association between the real effective exchange rate (REER) and trade performance employing data collected from a single country or group of countries. In these studies, trade models that are empirically estimated are basically developed from the traditional theoretical partial-equilibrium model laid-out by [Goldstein and Khan \(1985\)](#). They can be in the form of an import function, an export function or a trade balance function ([Rose, 1991](#); [Marsh and Tokarick, 1996](#); [Bahmani-Oskooee, 2001](#); [Bénassy-Quéré et al., 2001](#); [Chinn, 2004](#)). Generally, previous studies in this research stream take into account the movement of a broad REER index while adopting cointegration techniques to investigate whether the REER plays as a long-term determinant of trade performance.

In Vietnam, a number of studies have been conducted with an attempt to trace the association between the exchange rate and trade performance, providing evidence that the exchange rate was a significant factor influencing the country's trade performance in the long term as well as in the short term (for example, see [Phan and Nguyen \(2007\)](#); [Nguyen \(2011\)](#); [Ha and Pham \(2013\)](#); [Nguyen et al. \(2014\)](#) and [Nguyen \(2018\)](#)). A few studies have tried to measure the REER and evaluate the extent of currency misalignment (for example, see [Ha and Pham \(2012\)](#)). However, most of these studies have a number of limitations. First, the span of data is quite short in nature to trace a long run relationship. Second, the computation of REER is based on a quite small trade basket resulting in a measure of REER that is not broad enough to represent the country's external competitiveness. Third, when estimating the EREER (and evaluating the degree of currency misalignment), the authors did not interpret clearly

the model suggested by Edwards (1988) with regards to long-run fundamental variables and short-run nominal ones.

3. RESEARCH METHODS AND DATA

3.1. The Theoretical Model

Generally, the equilibrium real exchange rate (ERER) is viewed as the level of the real exchange rate (RER) at which both external balance and internal balance are achieved (Williamson, 1985). Isard (2007) surveyed and reported a variety of analytical frameworks to conduct the assessment of exchange rate misalignments. In terms of a long run equilibrium concept, purchasing power parity is the most commonly adopted analytical framework. In terms of a medium run equilibrium concept, model-based empirical approaches are usually applied. Besides these analytical frameworks, a measure of the black market premium is also used for the case of developing countries (Goh and Kim, 2006).

Of the model-based empirical approaches, the seminal model introduced by Edwards (1988;1994) is considered suitable to open small developing countries in estimating the ERER, which is then used as a basis for measuring the extent of exchange rate misalignment when comparing it with the actual RER. The ERER under this theoretical model is defined as the relative price ratio of non-tradables to tradables, at which both the internal and external equilibrium are simultaneously achieved. Consequently, it is modelled as a function of a range of fundamental determinants. An extensive number of studies have adopted and extended Edwards' model to estimate the ERER for emerging and developing countries (for example, see, Elbadawi (1994); De Broeck and Slok (2001); Spatafora and Stavrev (2003) and Goh and Kim (2006).

Similarly, Montiel (1999) develops an empirical model for estimating the ERER that reconciles all the possible fundamental determinants. Under this analytical framework, the ERER is denoted as the rate that is in consistence with the steady-state value of a country's international net creditor position under the existing relevant policy and exogenous variables. The considered long-run fundamental determinants include factors such as productivity, government expenditure, terms of trade, capital flows, and policy variables.

Given the availability and quality of data, this study conducts an assessment of the magnitude of currency misalignment for the Vietnamese dong by adopting the approach pioneered by Edwards (1988;1994) and Montiel (1999). The model of ERER is written in terms of a function of fundamental determinants as follows:

$$e^*_t = \beta_0 + \beta_i X_{it} + u_t \quad (1)$$

Where e^*_t denotes the ERER and the X_{it} represents the vector of fundamental determinants.

However, the actual RER is driven by both real and nominal variables. Thus, in buiding the model of ERER, Edwards (1988) assumes that changes in the actual RER in short run are determined as per Equation 2 as follows:

$$\Delta e_t = \alpha_1 (e^*_t - e_{t-1}) + \alpha_2 PoliGap_{it} + \alpha_3 \Delta E_t \quad (2)$$

where e_t is the actual real exchange rate, $PoliGap_{it}$ is the gap between the measure of actual monetary variables and the measures of the monetary policy that is consistent with the ERER, and E_t is the nominal exchange rate; the three parameters, α_1, α_2 and α_3 capture the speeds of adjustment to the direction of the equilibrium rate, to the policy gap, and to the nominal depreciation. Thus, Equation 2 indicates a mean reversion property of the actual RER in the long-run with the mean being the ERER.

Replacing e_t^* in Equation 2 by Equation 1, we can arrive at the reduced-form equation for the actual RER as Equation 3 as follows:

$$e_t = \gamma_0 + \gamma_i X_{it} + (1 - \alpha_1)e_{t-1} + \alpha_2 \text{PoliGap}_{it} + \alpha_3 \Delta E_t + v_t \quad (3)$$

Where the parameters γ_i represents a combination of the respective β_i and α_1 .

In brief, the approach applied by Edwards (1988;1994) and Montiel (1999) in estimating the EREER is based on the following analytical framework. First, the EREER is determined by the long-run fundamentals. In the short-run, the actual RER may diverge from the EREER, but it will adjust to its long-run equilibrium. Third, in the short run, the volatility in the actual RER is also driven by nominal variables, namely the monetary policy variables and the nominal exchange rate. This means that these nominal variables have only transitory effects, but no long-run effects, on the EREER. In other words, the parameters of nominal changes in the exchange rate and the monetary policy variables turn out to be null in the long run. Such an analytical framework suggests that the cointegration technique is relevant in estimating the EREER and currency misalignment.

Following the approach adopted by Edwards (1988;1994); Montiel (1999) and Goh and Kim (2006) the author identifies a set of fundamental determinants for the EREER as follows:

- **External terms of trade (TOT).** This determinant refers to the ratio of the export price index to the import price index. Its impact of on the EREER is not clear due to the interaction between income and substitution effects that may take place contemporaneously.
- **Government consumption of non-tradables.** An increase in government consumption of non-tradables tend to build up the price of non-tradables, inducing an appreciation of the domestic currency in real effective terms. Thus, if the EREER is defined in indirect quotation, it is expected to rise in value.
- **Controls over capital flows.** A liberalization of capital account would ease the cross-border move of capital flow. The capital account may improve or worsen depending on the return differential across the national financial markets as well as the investment opportunities of the domestic economy. If the removal of capital control results in net inflows of capital, the domestic currency is expected to appreciate or the EREER is expected in increase in value.
- **Degree of trade restriction.** A developing country that liberalizes its international trade would experience a period of worsening current account, leading to a depreciation of the home currency or a decrease in the EREER.
- **Level of technological progress.** Technological progress is considered a key factor to the growth in labour productivity. According to Balassa (1964) and Samuelson (1964) improvements in productivity normally take place in the industries producing tradables, thus raising the relative price of non-tradable goods. Therefore, technological progress would boost the value of the domestic currency, making the EREER rise.
- **Investment.** Investment in open developing economies is considered import intensive. Thus, a growth in investment would worsen the trade balance, thus leading to a depreciation of the domestic currency or a decrease of the EREER.
- **Monetary policy variable.** Monetary authorities may wish to stimulate the economy in a short-run through an excessive monetary expansion. The effect on the EREER tends to be different across exchange rate regimes. Under a flexible regime, an excessive increase in money supply goes along with an excessive supply of domestic credit and a decrease in the interest rate level. This normally induces a boost in demand for non-tradables, hence raising the value of the domestic currency or pushing the EREER up. However, if the economy is stimulated to promote investment activities, the current account would be worsened, giving

rise to a depreciation of domestic currency or a decrease of the ERER. Under a fixed regime, an excessive monetary expansion may not be effective due to an immediate reversal of capital flow, thus having no effect on the ERER.

It should be noticed that the above-mentioned set of fundamental variables is desired for the empirical estimation, however, some of the variables are not readily available for a developing country like Vietnam. Following [Mongardini \(1998\)](#) and [Goh and Kim \(2006\)](#) apart from the variable of *TOT* that can be obtained for the examined period, the current study uses proxies for substituting six mentioned fundamental variables and policy variables as follows:

- The ratio of overall government consumption to GDP is used as a proxy for government consumption of non-tradables (*GovCon*).
- The Chinn-Ito Index is used as a proxy of the measure of controls over capital flows¹ (*FinOpenness*).
- The degree of openness measured as the ratio of total trade to GDP is used as a proxy for the degree of trade restrictions (*TradeOpenness*).
- The labour productivity measured as the level of per capita GDP is used as a proxy for Vietnam's technological progress (*Techno*).
- The ratio of the gross fixed capital formation to GDP is used as a proxy for investment (*InvGDP*).
- The ratio of domestic credit to GDP is used as a proxy for the monetary policy variable *CreditGDP*.

All the mentioned measures are expressed in natural logarithm except for the Chinn-Ito Index.

3.2. Estimation Procedure

The author adopts cointegration technique to uncover the long-run and short-run determinants of the RER. It should be noticed that the data set used for estimation consists of a span of 26 annual points only while there are many regressors. Therefore, the authors forgo the data intensive Johansen procedure and employ the Engle-Granger approach instead, which is conducted in two steps. The first step basically involves an estimation of the long-run equilibrium relationship as per [Equation 1](#) using data series in level. Within the first step, a procedure consisting of three sub-steps is conducted, including: (i) examining the order of integration of the data series by applying the Dickey-Fuller unit root tests based on generalized least squares – DF-GLS ([Phillips and Perron, 1988](#)) (ii) in the case that the data series appear to have the same order of integration, estimating the long-run equilibrium relationships as per [Equation 1](#) based on the ordinary least squares method (OLS); (iii) conducting a unit root test for the residual derived from the obtained model of the ERER. In the process of estimating [Equation 1](#), any statistically insignificant variables will be dropped out to obtain a parsimonious empirical model for uncovering the long-run determinants of the ERER for the Vietnamese dong. If the residual of the parsimonious model does not possess a unit root, the author would come to the conclusion about the existence of a cointegration between the RER and the discovered fundamental variables.

The second step of the Engle-Granger procedure is carried out by further estimating an error correction model (ECM) to explore the short-run dynamics of the actual RER. The variables that may drive the actual RER in the short-run and are built in the ECM include the lagged error correction item, current and past differenced fundamental variables, the differenced policy monetary variable represented by the ratio of total credit to GDP, and the differenced nominal exchange rate. A dummy variable taking value of 1 for years 2007 and 2008 is also included

¹The Chinn-Ito index (KAOPEN) measures a country's degree of capital account openness. It was used first time in Chinn and Ito (2006). It is constructed on the basis of the tabulation of restrictions on cross-border financial transactions reported in the IMF's Annual Report on Exchange Arrangements and Exchange Restrictions (AREAER).

in the ECM for capturing the effects of Vietnam's accession to WTO.² In the process of estimating, the author excludes those variables that are not statistically significant until a parsimonious ECM is obtained. If the estimated coefficient associated with the lagged error correction term is statistically significant, it would indicate a mean reversion property of the actual RER in the long-run with the mean being the EREER, confirming again that the EREER is driven by the identified long-run determinants.

In order to measure the misalignment magnitude of the Vietnamese dong, the author compares the estimated EREER against the actual RER represented by the real effective exchange rate (REER). The estimated EREER is calculated on the basis of the cointegration relationship under the obtained parsimonious model -- the result of estimating Equation 1. As the exchange rate is defined in indirect quotation, its increase is considered as an appreciation while its decrease is interpreted as a depreciation in real terms of the domestic currency. This type of quotation also means that if the actual RER is above (below) the estimated EREER, the Vietnamese dong is considered as being overvalued (undervalued).

3.3. Data

Most of the data are collected from the International Financial Statistics (Online) and the General Statistics Office of Vietnam (GSO) for the period 1992-2017. Annual data on the real effective exchange rate (*REER*) and the nominal effective exchange rate (*NEER*) are adjusted on the basis of monthly data obtained from Nguyen (2012) and additionally computed by the authors for recent years. The data on TOT, overall government consumption, gross fixed capital formation and domestic credit are obtained from website of *Ieconomics INC* (*tradingeconomics.com*). The Chinn-Ito Index (KAOPEN) is taken online from website *web.pdx.edu*.

4. ESTIMATION RESULTS AND DISCUSSION

4.1. Long-Run Determinants of the EREER in Long-Run

Table 1 reports the results of Dickey-Fuller-GLS unit root tests. According to the test results, the built-in variables appear to not contain a unit root in level but are stationary in their first differences at the 1% critical value (6 variables) and at the 5% critical value (2 variables). Thus, the series appear to be commonly integrated of order 1. Thus, a long run equilibrium relationship possibly exists among the variables as per Equation 1.

Table-1. Results of the DF-GLS unit root tests.

Period 1992-2017		
Variables	Level	First difference
<i>TOT</i>	-2.557	-4.504**
<i>GovCon</i>	-2.198	-2.448*
<i>FinOpenness</i>	-2.418	-3.480**
<i>TradeOpenness</i>	-2.711	-5.189**
<i>Techno</i>	-2.087	-4.156**
<i>InvGDP</i>	-2.032	-2.665*
<i>CreditGDP</i>	-1.094	-3.184**
<i>neer</i>	-1.705	-2.983**

Note: The tests are performed with an intercept and a time trend for all variables in level and with an intercept only for variables in first differences except for TOT; for TOT, the tests are performed with an intercept in level as well as in first differences; the null hypothesis of the DF-GLS unit roots tests is that the variable has a unit root; **, *, and # denote the significance at the 1%, 5% and 10% level, respectively.

As described in section 3, the OLS method is applied to uncover the long-run equilibrium relationship as per equation (1). Table 2 presents the obtained parsimonious empirical model with the identified determinants of the Vietnamese dong's EREER together with their associated coefficients. The results of Dickey-Fuller-GLS unit root

² After accession to WTO, Vietnam experienced a strong surge in capital inflows in 2007 and the first half of 2008, which strongly supported the appreciate of the Vietnamese dong at the time.

test with t-Statistic of -4.78 indicate that the residual is stationary at the 1% significant level. Thus, in a long-run equilibrium, the Vietnamese dong's ERER is driven by the presented fundamentals. As seen in Table 2, the associated parameters appear to be statistically significant at the 5% critical value and most possess the expected signs. The adjusted R² at value of 0.911 indicates that the obtained model is of a high goodness-of-fit

Table-2. Long-run determinants of the ERER. of the Vietnamese dong: Period 1992-2017.
(Dependent variable: REER)

Independent variables	Coefficient	SE	t-Statistic	Probability
Constant	1.268	0.739	1.715	0.101
<i>TOT</i>	-0.496	0.220	-2.252	0.036
<i>Techno</i>	0.544	0.102	5.307	0.000
<i>FinOpenness</i>	0.097	0.033	2.929	0.008
<i>InvGDP</i>	-0.188	0.060	-3.146	0.005
<i>GovCon</i>	0.239	0.096	2.484	0.022
No. of observations: 26				
Prob(F-Statistic): 0.000				
Adjusted R ² : 0.911				

The fundamental variables that appear to drive the value of the ERER in the long-term include external terms of trade (*TOT*), controls over capital flows (*FinOpenness*), technological progress (*Techno*), investment (*InvGDP*) and government consumption (*GovCon*). The coefficient associated with the external terms of trade (*TOT*) possesses a negative sign, suggesting that an improvement in *TOT* will cause the ERER to decrease. Though an improvement in *TOT* may result in the appreciation of the ERER, the overall effects of the *TOT* on the ERER depend on the interaction between the income and substitution effects. Given the fact that Vietnam's exports consist mainly of raw products and labour intensive products, the income effects may not be dominant. The variable of controls over capital flows displays a positive sign, implying that an increase in the degree of capital openness tends to appreciate the RER. The magnitude of the estimate suggests that a 1% increase in the degree of financial openness would give rise to an increase of 0.097% in the ERER. The estimate for technological progress (proxied by real GDP per capita) implies that an increase of 1% in real GDP per capita would lead to an increase of 0.544% in the ERER. This magnitude is close to that reported for China by Goh and Kim (2006) appearing to be consistent with Balassa-Samuelson effect (Balassa, 1964; Samuelson, 1964). Finally, the variable of investment (measured by ratio of the total capital formation to GDP) exerts a negative impact on the ERER, but with a quite small magnitude. A 1% increase in the ratio of total capital formation to GDP induces a depreciation of about 0.19% in the ERER. This impact reflects the fact that investment activities in an emerging economy like Vietnam tend to be much more import intensive than consumption. The estimate associated with *Government consumption* (*GovCon*) also exhibits a positive sign as expected, suggesting that an increase of 1% in the ratio of the government consumption to GDP would drive an appreciation of 0.24% in the ERER. This finding is comparable with those reported in previous studies such as Elbadawi (1994) for Chile, Ghana, and India and Goh and Kim (2006) for China, appearing to reflect the fact that the government consumption tends to build up the price of non-tradables, thus driving up the RER.

The results of estimation do not suggest trade openness as a significant determinant as well though its associated coefficient displays the expected negative sign. This may be due to the fact that the effect of financial openness has dominated that of trade openness. The shift in the credit management mechanism since 2011 has also contributed to the reduction of the effect that trade openness might bring about.

4.2. Short-Run Determinants of the RER

The short-run dynamics of the RER is analysed with the use of an error correction model (ECM) as explained in section 3. The final parsimonious model consists of six variables with their corresponding coefficients presented in Table 3. There are four estimates, including that of the error correction term are significant at the 1% critical

level while the two estimates are significant at the 5% critical level. All the coefficients possess the expected signs except for the monetary policy variable proxied by the ratio of total credit to GDP. The model also possesses a high goodness-of-fit with the adjusted R² of 0.839.

Table-3. Short-run determinants of the RER of the Vietnamese dong: period 1992-2017.

(Dependent variable: $\Delta REER$)

Independent variables	Coefficients	SE	t-Statistic	Probability
Cons \square an \square	0.035	0.006	6.086	0.000
$\Delta FinOpeness$	0.0659	0.018	3.579	0.002
$\Delta TradeOpeness$	-0.218	0.052	-4.212	0.001
$\Delta CreditGDP$	-0.091	0.034	-2.689	0.015
$\Delta NEER$	0.395	0.078	5.070	0.000
$WTOEffect$	0.041	0.017	2.445	0.025
ect_{-1}	-0.479	0.113	-4.255	0.001
No. of observations: 25 after adjustment				
Prob(F-Statistic): 0.000				
Adjusted R ² : 0.839				

In the short run, the degree of trade openness has a negative impact on the RER. An increase of 1% in the degree of trade openness would drive the RER to decrease by 0.22%. The estimate for the controls of capitals implies that a 1% rise in the degree of capital account openness would appreciate the RER by 0.07%, a magnitude that is a little less than the effect of that variable in the long run. The effect of becoming a member of WTO indeed contributes to an appreciation of about 4% in the RER in the first two years following Vietnam's accession to WTO. The variable *government consumption (GovCon)* turns up as having no influence on the RER in the short-run, thus being omitted in the parsimonious final model. The estimate for the variable *ratio of total credit to GDP*, used as a measure for the monetary policy variable, appears to have a negative sign. The estimation result suggests that a 1% increase in this variable would depreciate the RER by 0.14% in the short-run. Theoretically, an excessive monetary expansion under a fixed regime is expected to be instantly followed by capital outflow, thus not affecting the RER (Edwards, 1989;1994; Montiel, 1999). In the meantime, under the flexible regime, an excessive expansion in money supply would decrease interest rates, thus promoting local demand for non-tradable goods and giving rise to an increase in the RER (Edwards, 1989;1994; Montiel, 1999). The negative impact of the monetary policy variable may reflect several facts of the Vietnamese economy. First, during the examined period, the expansion monetary policy was often used as a tool for promoting economic growth or stimulating the economy after crises. Second, the fund available under expansion credit policies of commercial banks was normally channelled to the corporate sector. Thus, an excessive monetary expansion was normally associated with a growth in investment, which appeared to be import intensive for a developing country like Vietnam. Indeed, the variable *ratio of total credit to GDP* and the variable *investment to GDP* can be interchangeable in the final parsimonious model, producing almost the same regression results.

The estimate for the nominal exchange rate shows that a nominal devaluation of 1% possibly induces a devaluation of only 0.40% in the RER. This means that about 60% of the effects of nominal devaluation are removed in one year. The magnitude of the effect is more or less corresponding the range between 0.467-0.698 found in the study of Edward (1994) conducted for 33 countries or in the study of Goh and Kim (2006) for the case of China. The lower magnitude for the case of Vietnam may be due to a high degree of exchange rate passthrough in a high inflation environment as compared to the international context as reported in Nguyen (2012). Thus, any gains from a competitive devaluation would be quickly diminished.

The coefficient on the error correction term reveals the pace by which the actual RER adjusts towards its equilibrium level after a shock occurs. The estimated coefficient is statistically significant at the 1% critical level, confirming again the existence of the long-run relationship between the RER and the fundamental variables. It

suggests that a gap between the actual RER and its long-term equilibrium level is removed by about 48% per year. In other words, it takes about 2 years for the actual RER to converge towards its equilibrium level. Such a slow pace of adjustment reflects the practice of the exchange rate regime in Vietnam as discussed in [Nguyen \(2012\)](#) and [Nguyen \(2018\)](#). During the examined period, when conducting exchange rate policy, the policy makers rather emphasized the stability of the bilateral VND/USD rate. As a consequence, the Vietnamese dong appeared to be pegged to the US dollar as many consecutive years as possible except for the periods of crises. The unavoidable devaluations were enforced at the time of crises when the level of the VND/USD exchange rate explicitly proved to be no longer suitable. Given the slightly lower magnitude of the coefficient associated with the nominal exchange rate as compared to pace of adjustment, nominal adjustment of the exchange through devaluation may not represent an effective tool for gaining trade competitive advantages as suggested by [Edward \(1994\)](#).

4.3. The Misalignment of the Vietnamese Dong

As seen in [Figure 1](#), the movement in the actual RER (the REER) is plotted in a contrast with that of the estimated equilibrium real exchange rate (ERER) along with its 95% confidence bounds. Given the exchange rate is expressed in the indirect quotation, its upward movement means that the Vietnamese dong appreciates in real terms while its downward movement is associated with a real depreciation. This type of quotation also means that if the actual RER is above (below) the ERER, the Vietnamese dong is considered as being overvalued (undervalued). For a more visual assessment of the magnitude of the misalignment of the Vietnamese dong, [Figure 2](#) depicts the distances in percentage by which the actual REER deviates from the estimated ERER.

As presented in [Figure 1](#) and [Figure 2](#), during the examined period, the Vietnamese dong appears to be undervalued during periods such as 1993-1995, 2003-2005, 2011-2014 while being overvalued during periods such as 1996-2002, 2007-2010, 2015-2017. Virtually, each period of undervaluation run after a sizable devaluation, which was made with an aim to recover the lost external competitiveness in the previous period. The period 1988-1991 experienced several radical reforms to help the country get away from a serious economic crisis with a near hyperinflation and start its transitional path to a market economy. The Vietnamese dong was so frequently devaluated, and the official exchange rate converged so quickly toward the parallel market rate. The large falls in the nominal value of the Vietnamese dong halted and reversed the loss in external competitiveness. Consequently, the Vietnamese dong underwent a short period of undervaluation in years 1993-1995.

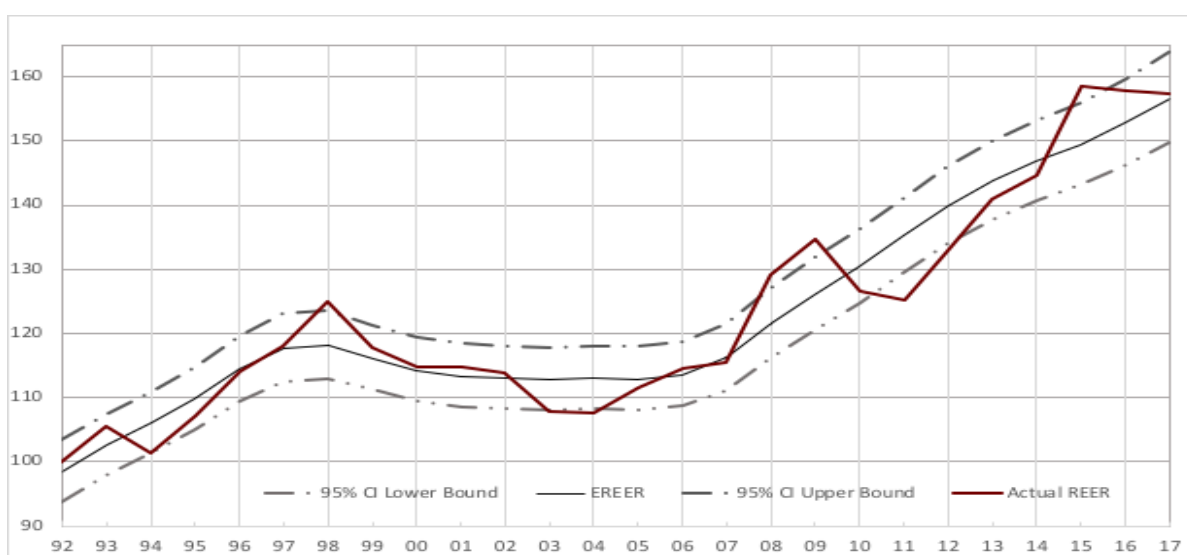


Figure-1. Actual REER versus estimated ERER (1992-2017).

Note: Index 1992=100 (increase implies appreciation).

The period of undervaluation quickly transited to a long period of overvaluation (1996-2002). Several factors contributed to building up this period of overvaluation. First, the key nominal VND/USD rate was tightly regulated to remain rigidly stable throughout the years 1992-1996 while inflation differential became unfavourable to Vietnam again in years 1995-1996 and the US dollar considerably appreciated against many currencies, most of which were those of Vietnam's major trading partners. Consequently, the REER moved up rapidly. In the context that many Asian currencies were forced to be devaluated by enormous magnitudes and some consequently floated during the region's financial crisis in years 1997-1988, the Vietnamese monetary authority initially responded by broadening several times the trading band permitted around the official VND/USD rate. These responses actually represented a number of hesitant and restrained devaluations of the Vietnamese dong. Nevertheless, these rather small-scale devaluations appeared not sufficient to be in line with the plummeting in the value of other currencies in the region. Consequently, the currency continued to appreciate sharply, reaching the peak of overvaluation in 1998 (see Figure 3). To counteract the pressure from the increasing trade deficit, the authorities imposed regulations on imports and foreign exchange. At the same time, a number of large-scale devaluations were made consecutively towards the end of 1998. Apparently, these delayed devaluations were critical to shrink the value of the Vietnamese dong in real terms (see Figure 3). They were taken by the Vietnamese monetary authority under such a circumstance that the value of other currencies in the region started their return to the phase of stabilization in the relationship with the US dollar and inflation in Vietnam was controlled to be comparable with its trading partners. As of 2000 and 2001, the actual real exchange rate was still above its equilibrium value though the extent of overvaluation was considerably much lower than that in preceding years.

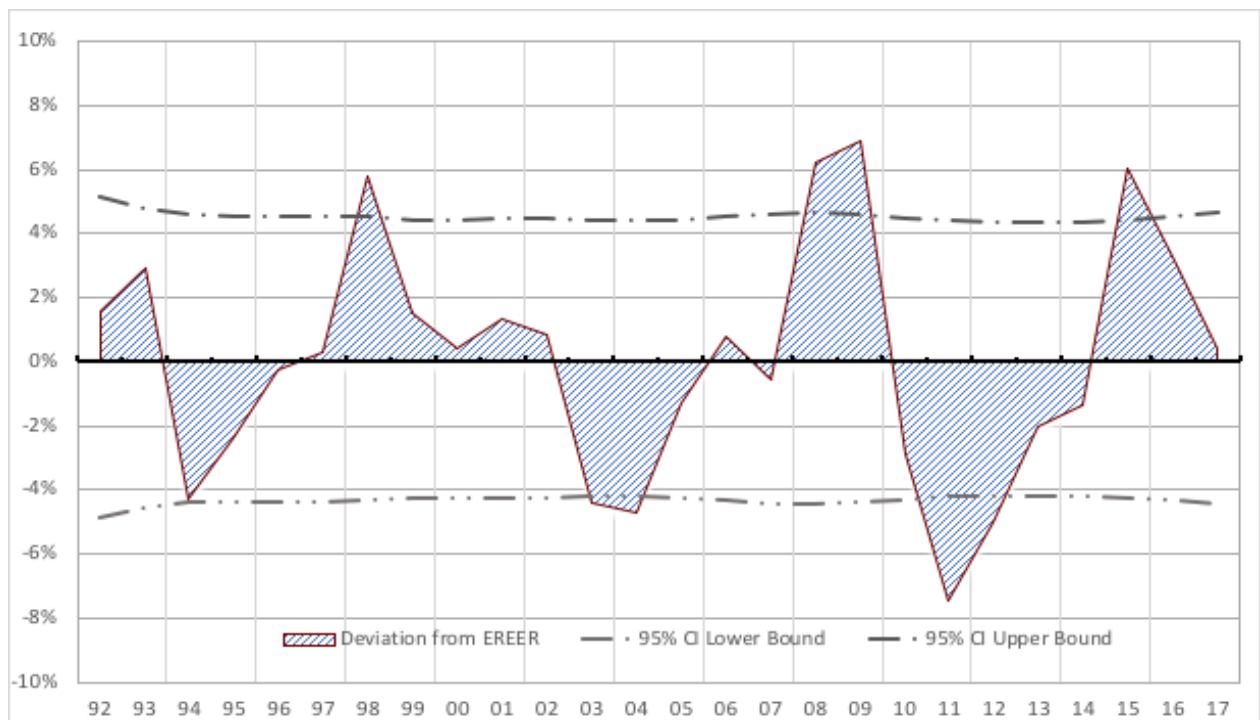


Figure-2. Estimated misalignments of the Vietnamese dong (1992-2017).



Figure-3. Nominal USD/VND, NEER and REER, 1992-2017.

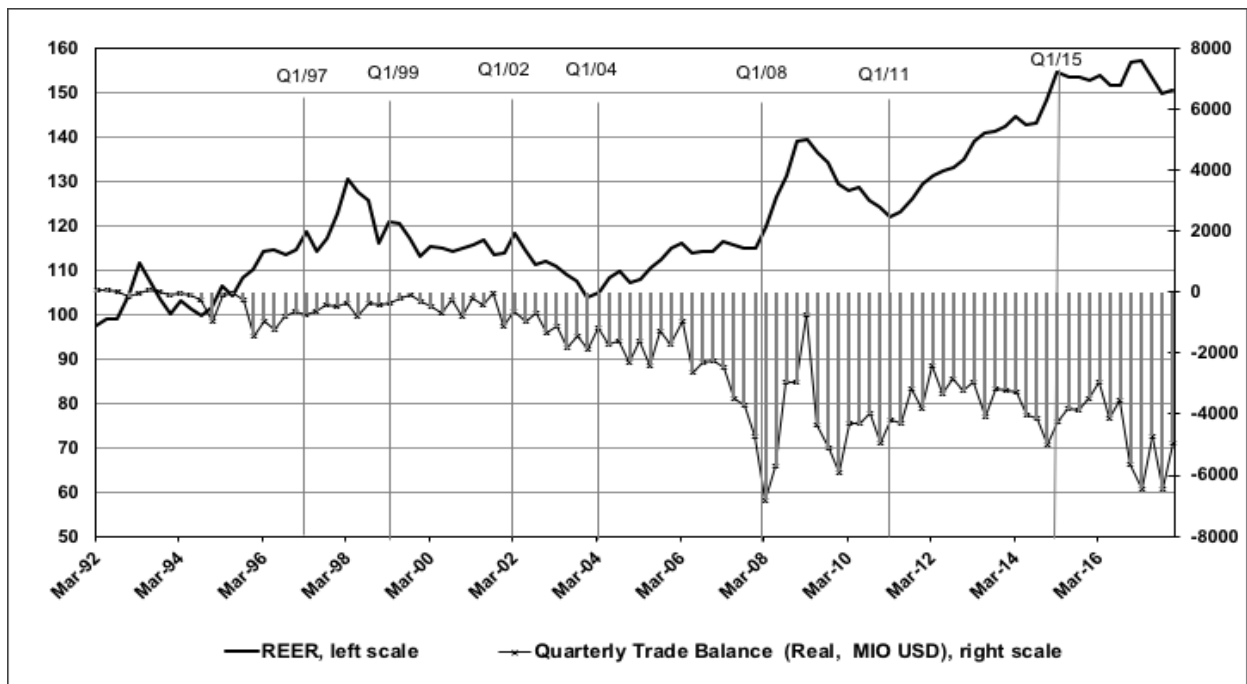


Figure-4. REER and trade balance, 1992-2017.

The implied loss in competitiveness appears to have been substantial during the period 1996-2001, especially under the perspective of measures of trade liberalization that Vietnam was bound to carry out in the framework of commitments under the ASEAN Free Trade Area (AFTA) and bilateral trade agreements (Nguyen, 2012). Due to this continual process of economic integration of the country, and possible because of other reasons, the Vietnamese dong was regulated to be gradually depreciated by about 2 per cent per annum since mid-2001. As inflation was kept quite low since 2000 while the US dollar itself depreciated against many other currencies, the real effective VND continued its depreciating trend and turned out to undergo a period of pronounced undervaluation from 2003 to 2005, with its peak of undervaluation in 2004. However, this period of undervaluation did not help improve the trade performance as the trade barriers in terms of tariffs, foreign exchange controls and trade restrictions, were

gradually and definitely removed as the commitments under AFTA and bilateral trade agreements started to become effective since 2001 (see [Figure 4](#)).

After 2004, the real effective value of the Vietnamese dong was again on its appreciating trend, quickly shifting to the period of overvaluation 2007-2010. It appears that the country's continual high inflation since 2004 was the main factor driving the value of the currency up to exceed its equilibrium level. The country's inflation rocketed by a year-on-year rate of 28% in August 2008, the highest inflation rate since 1993. Under the pressure of reversed portfolio flows attributed to the global economic recession, the value of the Vietnamese dong against the US dollar was managed to devaluate by about 10.4% in total for years 2008-2009. This magnitude of downward adjustment was apparently not enough to offset the high inflation rates for many consecutive years since 2004. By 2009, the Vietnamese dong reached its peak of overvaluation in effective terms. This performance of the actual RER suggests a substantial loss in the country's trade competitiveness. Indeed, during this period, increases in the trade deficit were clearly associated with rises in the actual RER. Consequently, the trade deficit was at the alarming extents during years 2006-2009 (see [Figure 4](#)).

Faced with the pressure from trade deficit combined with accelerating appreciation of the currency, the authorities allowed the Vietnamese dong to devaluate against the US dollar by about 19.3% within two years 2010-2011. In the meantime, the nominal effective rate of the US dollar also depreciated by about 9% over these two years. Consequently, the actual RER of the Vietnamese dong steadily depreciated and transited to the period of undervaluation 2010-2014, contributing to the improvement in the country's trade performance. Indeed, the magnitude of trade deficit was considerably reduced from 2010 Q1 to 2013 Q4 (see [Figure 4](#)). Noticeably, the Vietnamese dong again turned out to be pegged to the US dollar since 2012 while the inflation rates remained to a certain extent higher as compared to those in the international context, the currency quickly became overvalued in years 2014-2017. Again, the trade deficit seemed to be on an increasing path during this sub-period. However, towards the end of this sub-period there was a signal that it reversed to its equilibrium since 2016 Q4. This last adjustment to the equilibrium level of the RER might partly reflect the consequence of adopting the new exchange rate setting mechanism since early 2016.³

5. CONCLUSION

The purpose of this paper is to uncover the determinants of the equilibrium real exchange rate of the Vietnamese dong and investigate if there was any misalignment of the Vietnamese dong over the period 1992-2014. The framework developed by [Edwards \(1989;1994\)](#) and [Montiel \(1999\)](#) is adopted for this purpose. The results of econometric analysis indicate that the Vietnamese dong was overvalued during the periods 1996-2002, 2007-2010, 2015-2017. This was due to the fact that the Vietnamese dong was kept rigidly stable while the economy experienced a persistent high inflation environment through many consecutive years in the past. The overvaluation of the Vietnamese dong obviously contributed to the deterioration in the trade account. The monetary authority allowed the currency to be largely devaluated only at the time when loss of competitiveness was clearly discerned and when there were pressures emerged from crisis periods. However, due to a high degree of exchange rate passthrough to inflation, the competitive gains from any devaluation were soon eroded. The findings appear to be consistent with the empirical evidence about the association between the exchange rate and trade performance reported in [Nguyen \(2018\)](#). An important message from the findings is that the real exchange rate should be

³ Upon the new exchange rate setting mechanism, the daily official exchange rate VND/USD which is announced by the State Bank of Vietnam is now called the "central exchange rate". This rate is set on the basis of taking into consideration the movement of the weighted average interbank exchange rate VND/USD, the movement of the value of a number of key currencies on the international foreign exchange market, the macroeconomic balances and the objectives of monetary policy; the trading exchange rates set by commercial banks remain to be allowed within the band of +/-3 per cent around the "central exchange rate" [SBV \(2015\)](#).

managed in line with its equilibrium level and any misalignment should be adjusted on time in order to maintain the country's trade competitiveness and external equilibrium.

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